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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,198	10/28/2003	Chien-Ping Huang	60173 (71987)	7288

7590 04/04/2005
Mr. Steven M. Jensen
Mr. Peter F. Corless
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101 Federal Street
Boston, MA 02110

EXAMINER

TRINH, HOA B

ART UNIT PAPER NUMBER

2814

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/696,198

Applicant(s)

HUANG, CHIEN-PING

Examiner

Vikki H. Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>0305</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 9-18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on Jan. 18, 2005.
2. It is suggested that in response to this Office Action, applicant cancels claims 9-18.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “external device” in claim 1, line 3, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet”

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (APA), figures 1-3, in view of Ho et al. (hereinafter Ho) (6,469,897).

APA discloses a multi-chip package device with a heat sink, comprising a chip carrier 20 (fig. 2) for electrically connecting the semiconductor package device 2 (fig. 2) to an external device (the examiner interprets bumps 13a connecting to a circuitry); at least one first chip 11 (fig. 1) or 21 (fig. 2) mounted on and electrically connected to a surface of the chip carrier 20 (fig. 2); at least one semiconductor package 1,15 (fig. 1) or 22 (fig. 2) mounted on and

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electrically connected to the surface of the chip carrier 10 (fig. 1) or 20 (fig. 2); and the heat sink 24 (fig. 2) mounted via an adhesion layer 23 (fig. 2) on a surface of the first chip 21 (fig. 2) and a surface of the semiconductor package 22 (fig. 2) that are opposite to surfaces of the first chip 21 (fig. 2) and the semiconductor package 22 (fig. 2) mounted on the chip carrier 20 (fig. 2).

However, APA does not explicitly teach that at least one hollow part extending through the heat sink is formed at an area of the heat sink free of contact with the first chip and the semiconductor package to release thermal stresses from the heat sink.

Ho teaches a ball grid array package having a carrier 210(fig. 2D), a chip, and a heat sink 220 (fig. 2D) with a through-hole 260 (fig. 2D) formed in the area of the heat sink that is free from contacting a the chip (fig. 2D)

APA and Ho are in the same field of endeavors.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the heat sink of APA with a through-hole, as taught by Ho, so as to release heat from the package.

As to claim 2, APA teaches that the semiconductor package 2 (fig. 2) is a flip-chip ball grid array package (specification, page 3, line 11).

As to claim 3, APA teaches that the first chip 11 (fig. 1) is a graphic chip.

As to claim 4, APA teaches that the first chip 11 (fig. 1) is a graphic processing unit.

As to claim 6, APA teaches that the first chip 21 (fig. 2) is mounted at the center of the chip carrier 20 (fig. 2), and the semiconductor package 2 (fig. 2) is mounted at a position on the chip carrier 20 (fig. 2) corresponding to a corner of the heat sink 24 (fig. 2).

As to claim 7, the combined teaching of APA and Ho teaches that at least one pair of the semiconductor packages 22 (fig. 2) are mounted on the chip carrier 20 (fig. 2), and the hollow part 260 (fig. 2D, Ho) of the heat sink 220 (fig. 2D, Ho) is located between the semiconductor packages.

As to claim 8, at least one symmetrical pair 22 (fig. 2) of the hollow parts 260 (fig. 2D, Ho) are formed through the heat sink 260 (fig. 2D, Ho).

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (APA), figures 1-3, in view of Ho et al. (hereinafter Ho) (6,469,897), as applied to claim 1 above, and further in view of Behlen et al. (hereinafter Behlen) (5,598,033).

The combined teaching of APA and Ho discloses the invention substantially as claimed. However, APA and HO does not explicitly teach that the semiconductor package is a Random Access Memory (RAM) unit.

Behlen discloses a BGA package 300 (fig. 3) having a carrier 338, solder bumps 314 (fig. 3), and chip 310 (fig. 3), wherein the package is a volatile RAM (col. 1, line 13).

APA, Ho, and Behlen are in the same field of endeavors.

Therefore, it would have been obvious to one of ordinary skills in the art at the time the invention was made to modify the invention of APA and Ho with a RAM, as taught by Behlen, as merely a matter of selecting system for development.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

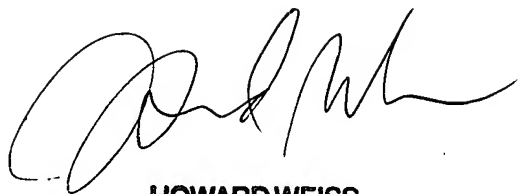
Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests

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to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814

A handwritten signature in black ink, appearing to read 'Howard Weiss', is positioned above the printed name.

**HOWARD WEISS
PRIMARY EXAMINER**